FISHERIES OF THE COPPER RIVER AND PRINCE WILLIAM SOUND

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By Jas. H. Lyman
Assistant Agent.

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PRELIMINARY REMARKS.

In pursuance of office communication of May 15, 1917, direct charge of the fisheries included between Controller Bay and the Western Entrance of Prince William Sound was assumed and central headquarters from which to conduct operations were established in Cordova.

In April of this year while the Bureau's agent was in Cordova attending to some fishery cases left over from 1916 and prior to the time when direct charge of the district was undertaken, several of the packing companies asked that a synopsis of the current laws and regulations as they particularly apply to this region, be drawn up and published. In response thereto, an especially prepared synopsis was made up which presented the information in such language as could be clearly understood by one and all. This, though later changed in one section by direction of the Bureau--the change affecting a clause referring to the distance interval between stake nets--was eventually published in a local paper so that all parties interested could be thoroughly informed on the subject. To promote still further a wide spread knowledge on the law three of the packing companies had printed copies made of this text which they furnished to their respective fishermen before active operations commenced. The plan as carried out had as it's purpose the dissemination of useful knowledge which

would promote the interests of the Bureau and that of the individuals and companies interested in the commercial fisheries.

The fisheries of this section can be said to be divided into two natural divisions each being marked by a difference in the species of salmon mainly supporting it and by a characteristic difference in the time of it's salmon run. The Copper and Bering River fisheries, though apart geographically, are grouped in the first division by reason of their many similarities. Prince William Sound forms the second division.

The coastal waters of the district extend from Controller Bay to the Western Entrance of Prince William Sound in a coast line of over 1200 miles, while in addition thereto, there are contiguous rivers, waterways, and sloughs, aggregating more than 200 miles. The most important river in point of size and salmon run, is the Copper which extends back in the interior for several hundred miles, and together with it's many tributaries drains an area of approximately 60,000 square miles. Second in importance is the Bering River, which taps about 22 miles of country lying north and north east from Controller Bay.

The coastal fisheries were not given as an intensive looking after this season as in 1916. There were several reasons for this. The time available for patrol work was lessened by reason of a delay in reaching the district incident to special work in Seattle and because of special investigations in the Copper River Vally which occupied some forty-five days of the season. Difficulties in securing boats when wanted hampered work of this nature to a large extent. Notwithstanding these facts most of the important regions were visited either on cannery tenders, commercial steamers, or local

mail boats. The interior parts of the Copper River were approached by train and auto-stage. Remote places on the tributaries of the Copper were reached by walking. The following indicates the approximate distances covered by each method of travel:

Chartered launches "Angelus" and "Buzzard"	275 miles
Cannery boats and others not chartered	810 "
Copper River & Northwestern Railroad	770 "
Auto-stage	650 "
Walking	250 "
Total	2,755 "

The salmon fisheries of the Copper River region for 1917 have been discussed in detail in a special report. Therefore, comments herein will be brief on such points as have already been covered. A discussion upon the fisheries of each division follows:

COPPER AND BERING RIVER REGION.

EXTENT:

The tidal waters included between the eastern side of Controller Bay and Point Whitshed, some ninety miles in extent; Bering River for twelve miles above it's outlet; and the Copper River to Mile 55, was the extent of commercial fishing in this region.

SALMON CANNERIES:

Last season was marked by an immense increase in the salmon canneries of this section. Three new concerns entered the field and engaged in direct competition with those three already established. The year 1917 brought with it one new cannery and the reestablishment of a resident cannery.

In preparation for the seasons run of salmon, the Moore Packing Company, a concern already established in the salmon canning business in Southeastern Alaska, extended it's operation in the territory in building a one-line plant on the north east side of Orca Inlet, about nine miles north of Cordova. All operations were conducted in one building--a structure 120 x 50 feet. The equipment consisted of the ordinary sanitary packing machines. The retainer used was the one pound tall can which was purchased in the collapsible form and reformed at the cannery. Power to run the machinery was obtained by means of a Pelton water wheel.

The Canoe Pass Packing Company whose plant was formerly on the ocean dock at Cordova in some rented buildings, built a new cannery at Sugar Point about six miles north of Cordova on the northeast side of Orca Inlet. This cannery which was operated as a two line plant is a modern and well equipped establishment. The cannery proper is 170 ft. long and 30 ft. wide with a storehouse 200 x 40 feet, a can

loft 50 x 10 feet, a sein loft 100 x 40 feet, a carpenter shop 50 x 24, an office 36 x 18 feet and two bunkhouses about 50 x 25. feet. The equipment includes four six car retorts, four ordinary steamboxes, two lines of up to date packing machines furnished by the American Can Company, and other miscellaneous furnishings. The plant is systematically arranged and presents an attractive and orderly appearance.

FIELD OF OPERATION:

Those concerns which operated last season carried on activities this year in the same localities as formerly with the exception of the Hoonah Packing Company and the Canoe Pass Packing Company. The former, though relying mainly on the Bering River field, brought it's crews to the Delta of the Copper River for a short while this year and entered into competition with some of the Cordova canneries. The Canoe Pass Packing Company enlarged it's field in the up river fisheries so as to include the Miles Lake and Abercrombie sections of the river. The Moore Packing Company depended largely on the humpbacks of Prince William Sound, but in order to secure a small pack of red salmon to supplement that of the pink, it operated jointly with the Canoe Pass Packing Company in the up river region of the Copper. Fishing was prosecuted vigorously on the Delta and on the main river--called herein the "up river fisheries"--at Mile 27, 46, Miles Lake, Abercrombie Canyon, and also, in the Bering River field.

CHARACTER OF OPERATIONS:

Fishing on the deltas of the Copper and Bering Rivers was conducted principally with gill nets, anchored, staked, and floating. Anchored sets found favor along the banks of the inland sloughs of the Copper and on each side of the main Bering River, while staked

nets found preferment along the outside water ways. Drifting was employed mainly near and about the bars over which the waters of the open ocean flow in entering the flats. Large traps were used on the western side of the delta between Point Whitshed and Mountain Slough, and were unsuccessfully tried out at the Egg Island and Big Softuck Bars. Operations in the up river fisheries at Mile 27 and 46, and Miles Lake, were with anchored gill nets. The canyon fishing was conducted mainly with dip nets, but here too, anchored gill nets found placement at such places as the Big Eddy and the Bear Holes. All fishing was greatly in excess of other years.

SALMON RUN:

Red and king salmon made their first appearance in numbers at the delta of the Copper during the last week in May. The run was at it's height early in June and then commenced to decline until, about the 5th of July, it became unprofitable to operate any longer. The red salmon continued to run, however, until early in September, and were fished for in the regions further up the river where commercial activity could be carried on more successfully than at the delta. Silver salmon commenced to run the latter part of August in these localities and lasted through the month of September. At Bering River the red salmon run was later. In a desultery way they made their appearance during the last week in June. The main run occurred on the 6th and 7th of July and then rapidly fell away until by the last of the month no fish could be obtained. The period for silver salmon was the same as that of the Copper River. Other species of salmon are foreign to this region. As reflected in the take of salmon in the Copper River region it could be assumed that the run of red salmon was better than last year, but if the run is studied in

connection with a comparison of the amounts of gear used during the two seasons it could be inferred that the excess in take this year over last was due more to the increase in activity rather than to an increased run, and that the actual numbers of salmon this year were less.

CLAM FISHERY:

An independent industry, that of clam canning, came into existence last season when the razor back clams in the vicinity of Mummy Island and Boswell Bay were used commercially by the Lighthouse Canning And Packing Company and the Pioneer Packing Company. In developing this new field many conditions foreign to those met with in other localites where the industry flourished, were encountered and the companies, during the first season, had to readjust their methods of operation im many respects to cope with changed conditions. It might be said that the first season in canning was an experimental one. That this was so was reflected in the small packs put up.

Profiting by the knowledge gained through the first years operation--that the clam beds accessible to development were limited to those found in a belt about five miles wide from Mummy Island to and including Boswell Bay on the northeast end of Hinchinbrook Island; that year around activities were impossible; and that the clams were best for canning purposes during a six months period beginning with April and ending in September--both companies concentrated all their efforts about the available beds and during the summer months in securing and in canning the product, with the result that a surprisingly large pack was put up. One of the companies secured 40,000 cases, probably the largest pack ever made on the Pacific Coast.

The Lighthouse Canning & Packing Company removed their equipment from the rented building which served as a cannery last season and reestablished it, with a few incidental improvements, in a new building close to the first which was constructed last winter. The new structure is 100 x 50 feet and two stories high. The upper part of the building is used as an office and store room while the lower floor is employed for canning operations.

Two other concerns entered this field with the expectation of canning both clams and salmon.

Early in the year the Alaska Sea Food Company, with Albert Barnes Moses of Seattle as manager, acquired the one-line Turner cannery near Point Whitshed some nine miles from Cordova. On April 4th, after about 400 cases of clams had been packed, the plant was distroyed by fire. Captain George Morgan, who had charge of field operations, immediately commenced reconstruction. A modern establishment was put up and equipped with one line of machinery of the Seattle-Astoria Iron Works make. Operation, however, were not continued.

The Pinacle Rock Packing Company put up some small buildings at Boswell Bay in preparation for the seasons work but some difficulties arose which prevented operations being carried on.

FISHERIES OF THE COPPER RIVER AND PRINCE WILLIAM SOUND. #9.

PRINCE WILLIAM SOUND.

EXTENT:

This subdivision includes those waters between the northern end of Hawkins Island at Point Salmo and Point Elrington--the western end of the Island bearing that name. Bay and inlets indent the land on every side each of which receives it's quota of small fresh water streams.

SALMON CANNERIES:

The fisheries of this district until last year were developed by the canneries of the Copper River Region as a supplement to those of the Copper River. A remarkable increase in the canning establishments here in 1916 and a grave deficiency in the red salmon packs due to a poor season in the Copper River section forced the cannerymen to direct their attention to the Sound fisheries. A remarkable run of humpbacks here permitted each concern to fill it's short pack. The more intensive development which ensued at this time brought out the possibilities of these fisheries as they never had been before with the result that two companies established canneries in 1917 purposing to draw their supply of salmon entirely from these waters.

The Copper River Packing Company undertook the construction of a three line plant on the west side of McClure Bay--an indentation on the south side of Port Nellie Juan--during the fall of 1916 and completed it in time to engage in this years salmon fishing. The plant consists of a cannery building 196 x 40 feet with an auxiliary ware room 188 x 60 feet, two bunk houses, china house, mess house, and a large sized building which includes store, office, and superintendents quarters. The main cannery building is seated on piles

which are continued out from it's face in a dock which reaches water of a depth to permit the docking of large steamers. The other buildings rest on a rock foundation. The equipment used consists of three lines of modern machinery which include fillers and retorts from the Seattle-Astoria Iron Works, and American Can Company packing equipment. Perfect Vaccum machines take the place of steamboxes. The fish are taken from the waters edge and landed on the fish house floor at the rear of the cannery by a twenty five foot conveyor. A clever arrangement at the end of the conveyor permits different species of salmon being shunted off into divisional pens on the cannery floor, thus facilitating their handling to the iron chink. One cutter, throwing fish into partitioned troughs, feeds the three lines of machinery. An ingeneous arrangement of belts leading from the iron chink handle the salmon to cleaning tables which are conveniently arranged to permit working room for twenty parties. In the rear of these tables and separated by a three foot space are a series of bins containing fresh water for cleansing the salmon after sliming, and in the angle thus formed there is a convex box which leads to the cutter.and supplies it with fish. One cutter throwing salmon into partitioned troughs, feeds the three lines of machinery. The entire equipment and it's arrangement makes for cleanliness and efficiency. The plant as a whole is well arranged.

The Valdez Packing Company, a newly organized concern incorporated in the state of Washington with G. Batcheller Hall as president, and manager, D. W. Hartzell as treasurer, I. M. Foster as secretary, and John Emel as superintendent, started active salmon canning operations this season. The company leased the municipal dock at Valdez with two buildings. One of these was employed as a cannery build-

ing and necessary changes for the purpose were made. Double seamers, clinchers, fillers and retorts of the Seattle-Astoria Iron Works make were installed in one full line of machinery. The other structure, with an additional leanto 30 x 80 feet was made use of as an office, mess house, ware room, and general work house where cooling, laquering, labeling, and boxing operations were carried on. The plant can hardly be called a model one from the standpoint of arrangement but it is believed that canning operations were conducted in a clean manner.

A shortage, as last year, in the packs of the canneries relying mainly upon the fisheries of the adjacent region brought all the establishments there, except the Copper River Packing Company at Abercrombie, to the Sound. In addition to these, there were the two resident canneries and the new San Juan Fishing & Packing Company's cannery at Seward--a total of nine canneries drawing wholly or in part from the Sound fisheries.

FIELD OF OPERATION:

Practically every locality where fishing could be prosecuted was visited by the crews of these concerns. The Copper River canneries, though confining their activities in the main to the bays on the east shore of the Sound and to the waters contiguous to Hawkins and Hinchinbrook Islands, were attracted to the western side to localities where red salmon could be secured. The two resident canneries operated on the western side from Jack Pot Bay to the northern end of Valdez Arm, each company endeavoring to secure it's fish in the neighboorhood of it's respective cannery. The establishment at Seward operated chiefly near and about Eshamy Bay. Red salmon fishing took place in Robe Lake, Jack Bay, Galena Bay, Columbia Bay,

Long Bay, Miners, River, Coghill River, Eshamy Lagoon, Bay of Isles, Jackpot Bay, and Nuchek. Operations for humpbacks were prosecuted all over the Sound, while dog and silver salmon fishing was conducted principally in the bays on the eastern side of these waters.

CHARACTER OF OPERATIONS:

Anchored gill nets were the principal forms of gear used in the red salmon fishing, while purse and drag seins were employed chiefly in the taking of humpbacks, silvers, and dogs. Traps for the first time in the history of the Sound fisheries were introduced. The Valdez Packing Company operated one at the head of Galena Bay, while the Canoe Pass Packing Company were the owners of one at Hell's Hole in Port Gravina, and one in Canoe Pass. The amount of gear employed greatly surpassed that of former years.

SALMON RUN:

Dog salmon, always in small numbers in these waters, commenced to show up about the middle of June and continued for several weeks, when the run ceased, to be followed by a desultery appearance of humpbacks. These last approached the Sound waters in spurts during the entire month of July and then gave way to the silver salmon run, which continued until late in September. Red salmon approached the larger streams of the district along with the humpbacks. In marked contrast to last year the humpbacks visiting this section were in small numbers. Several of the red salmon streams developed an increase in their quota of salmon. Sufficient data for a comparison of the dog and silver salmon run is not available.

SALTERIES:

One saltery was operated during the current season. The es-

tablishment of James Bettles at Eshamy Lagoon was taken over last fall by the Kenai Fishing & Trading Company, a concern incorporated under the laws of the territory and located at Seward. Mr. W. H. James, the company's secretary and treasurer managed the plant. Salt and barrels were secured early in the season together with fishing equipment, and activities were commenced on the 21st of June. Fishing was conducted chiefly in the lagoon. Here were set 2,800 fathoms of gill net webbing. The gas boats "Pensylvania" and"Augusta E.", outfitted for purse seining and drag seining respectively, were employed about the fishery. The total output of this company is not known but it is believed that very few barrels were salted after July 18, when 125 of red salmon had been put up.

HERRING:

The Bureau's efforts to introduce the Scotch method of curing herring in Alaska found many residents of this district ready to take the project up provided it could be developped that the herring of Prince William Sound were in numbers and of a quality adequate to support an industry. Though attempts in curing herring had been made in 1914 by two different parties--J. H. Cann and S. S. Lee,--the operations conducted were not of a nature to enlighten future operators very greatly as to the run of herring, the size, quality, and supply, or of a character to encourage further activities. Notwithstanding the lack of actual knowledge on these vital points, interest was quickened very greatly when the Bureau's new propanganda for increasing the supply of fishery products was learned of, and, when Mr. Anderson came to the district to give instruction in the Scotch cure, a concerted attempt was made to prospect the field to see if, as a sound business enterprise, it would justify development.

FISHERIES OF THE COPPER RIVER AND PRINCE WILLIAM SOUND. #14.

Three months study of the region by Mr. Anderson, prospective packers, and halibut operators, brought to light considerable information relative to the herring. Such data as is available at this writing is set forth in the following:

The first run strikes in from the ocean about the Latouche and Hoodo Island section of the sound. Halibut boats operating from Seward obtained considerable bait from this locality during the month of September. There is a record of one purse sein haul which netted the fishermen about 1400 barrels. In all probibility these fish enter the section before September but as yet there is no definite facts in support of this. The herring are found through out Latouche, Elrington, Prince of Wales, and Bainbridge passages, and in the neighboring bays. About the first of October they begin to travel northward and eastward towards the numerous bays and inlets on Knights Island and the mainland as far north as Kiniklik,and to Fidalgo, Gravina, Sheep, Simpson, and Cordova bays. In these localities they remain throughout the winter. During the spring months, during their spawning period, they seek the shallow bays and lagoons throughout the entire Sound.

Observations so far would indicate that the herring were of good quality and size and were in marketable quantities. Gus Olm, a resident fishermen, obtained a few barrels of herring in the vicinity of the Orca cannery and, under the instruction of Mr. Anderson, packed them by the Scotch cure method. The product, in kits and barrels, was disposed of locally and found a ready market. An absence of red feed in the stomachs of these fish makes them superior for packing purposes to those taken in southeastern waters.

The Bureau's work in this section, though not materially increasing the output of herring products for the current season, has laid the

foundation for future work. On the strength of information secured this season a number of prospective packers are making plans to develop the field.

PROSECUTIONS.

Only one violation of the fishery laws and regulations was noted during the current season. On the 15th of September during a patrol of Eyak River and Lake, two anchored gill nets belonging to Frank Lee, a native, were discovered set near the mouth of the river. On the same day, and following a complaint being filed in the Commissioners Court at Cordova, the native was brought to trial. The defendant entered a plea of guilty to unlawful fishing. He was dismissed with a fine of $5.00. Costs were paid by the court.

REPORT OF THE FISHERIES OF CENTRAL ALASKA 1917.

E. M. Ball

Assistant Agent.

CONTENTS.

Report on the Fisheries of Central Alaska in 1917.

Introduction.

At the beginning of the season of 1917, the central district of Alaska was divided into two parts, one of which comprises the region from Controller Bay to the western entrance of Prince William Sound, including the Copper River; the other extends from Resurrection Bay to Port Moller, exclusive of the Aleutian Islands west of Unimak Pass. This report embraces the fisheries of the western division.

The auxilliary schooner NIMROD of Kodiak (8 tons) was chartered for 60 days during the summer at a rate of $25.00 per day; the AGGIE J., an unregistered launch, was used 4 days at a charge of $15.00 per day. A total of 2,500 miles was traveled on these boats, in addition to which one trip on the SANTA ANA from Kodiak to Uyak and a few short ones on cannery boats were made. In this way the district was covered. The inspection work began at Ikatan Bay, which is the extreme western end of the district, and was carried eastward as the season advanced, the closing days being spent at Karluk and the canneries on Uyak Bay. The canneries at Nelson Lagoon, Alitak, and Seward were not visited, chiefly for lack of time.

Afognak Reservation.

Under the terms of the Department's Order of March 21, 1912, commercial fishing may be carried on within the Reservation only by such natives and white men married to native women as were living on Afognak Island and the smaller adjacent islands at the time of the promulgation of the order. To prevent abuses of the privilege thus granted, the Bureau has supervised each season all commercial operations and maintained a patrol of the reserved waters during the time of active fishing. Alfred Nelson, apprentice fishculturist at the Afognak hatchery, was detailed to perform this work during the summer of 1917, under the direction of the agent in charge of the district. He was authorized to issue the necessary permits as required by the Departmental Order above mentioned to those who made application for and were entitled to them. It had been the custom to issue special regulations governing these operations merely as measures designed to prevent overfishing, but on account of the great need and demand for fishery products it seemed advisable this year to waive all special regulations respecting gear and close seasons heretofore imposed, except to prohibit all operations in Afognak Bay, or Letnik Bay as it is often called, and Pauls Bay where the salmon were required for cultural purposes.

Fifty-six natives availed themselves of the privilege to fish. They arranged themselves into gangs of from 4 to 6 men each, and early in June repaired to fishing grounds of their own selection. Nets, consisting chiefly of seines, were furnished in every case except one by the Kadiak Fisheries Company, to which all salmon taken commercially

were sold.

Operations were carried on at six localities each of which, except Little Afognak, shows a larger production of fish than in 1916. There is satisfaction in noting that these streams are slowly recovering from the effects of the volcanic eruption in 1912 as evidenced by the increased production this season which though somewhat under the average yield for the seasons preceding that disaster is encouraging to the extent that from now on each season should show improvement over the preceding one until normal conditions are regained.

Little Afognak retains first place in the production of red salmon although the catch fell off slightly more than one third, there being a decline from 34,898 in 1916 to 22,157 for the current season. Izhut Bay which was reported as having produced none last year takes second place with a yield of 17,638 red salmon. Paramanoff leads in the production of humpbacks, 55,924 having been taken as against none in 1916; Danger Bay takes second place with 22,581 fish of this species, and Seal Bay third with 20,342. In the order of their production of all species of salmon, Paramanoff takes first place, while Seal, Izhut, and Danger Bay follow in the order named, leaving Little Afognak in fifth place as against a leading position in 1916. Taking the Reservation as a whole, a comparison of catches for 1916 and 1917 shows that sockeyes increased from 46,311 to 71,527, and humpbacks from 5,470 to 107,333, while cohos declined from 21,267 to 3,558. No kings or chums were taken.

It is reported that the run of sockeyes to Afognak Bay was unusually heavy, exceeding that of any year since the hatchery began operations,

and that a large collection of eggs was made.

The following table shows by localities and species the number of salmon taken commercially from the waters of the Afognak Reservation:

CATCH OF SALMON IN THE AFOGNAK RESERVATION, SEASON OF 1917.

Localities.	Sockeyes.	Cohos.	Humpbacks.	Total.
Malena	11,516	. . . .	1,315	12,831
Paramanoff	13,042	185	55,924	69,151
Seal Bay	6,990	462	20,342	27,794
Little Afognak	22,157	1,496	261	23,914
Izhut Bay	17,638	. . . .	6,910	24,548
Danger Bay	184	1,415	22,581	24,180
Total	71,527	3,558	107,333	182,418

The natives were paid approximately $4,800 for this catch of fish, all of which was sold to the Kadiak Fisheries Co., at Kodiak.

The following table indicates the method of capture of each species and the approximate beginning and ending of the fishing season in each locality:

APPARATUS AND APPROXIMATE FISHING SEASON, AFOGNAK RESERVATION, 1917.

Localities.	Seined.			Gilled.	Fishing season.	
	Sockeyes.	Cohos.	Humpbacks.	Sockeyes.	Began.	Ended.
Malena	11,056	. . .	./3/5	460	June	August
Paramanoff	12,964	185	55,924	78	Do.	Do.
Seal Bay	6,990	462	20,342	....	July	Do.
Little Afognak . .	21,651	1,496	261	506	June	September
Izhut Bay	17,638	. . .	6,910	....	July	August
Danger Bay	184	1,415	22,581	...	August	September
Total	70,483	3,558	107,333	1,044		

Salmon Industry.

The most prominent events in the district of Alaska covered by this report are the friction between the Pacific American Fisheries and the Sockeye Salmon Company over fishing grounds in Ikatan and Morzhovoi Bays with its attendant investigations, the exceptionally large run of red salmon at Karluk and Alitak with the almost total absence of other species, and the very heavy decline of all species in the Cook Inlet and Port Moller regions.

The disturbance at Ikatan grew out of an effort on the part of the Sockeye Salmon Company, a new organization, to oust the Pacific American Fisheries from a valuable trap location, one which it had occupied without question for a number of years. To accomplish this, the former company drove a trap within the prohibited distance of the latter's, and then sought to justify its action in so doing by setting up the claim that the older trap was an unlawful fishing appliance being located within five hundred yards of the mouth of a red salmon stream in violation of law. Notice was then served on the older company to remove its trap. In the investigation of this matter, several problems of large importance presented themselves for consideration and solution, but as yet they have not been solved. Those problems may be briefly stated as follows:

(a) Has any one a lawful right to drive or construct a trap within six hundred yards of a similar appliance driven within five hundred yards of the mouth of a stream whose use by red salmon is undetermined.

(b) Where such is done, is not the trap of latest construction an unlawful fishing appliance or unlawfully located pending the identification of the stream as being used by red salmon for spawning purposes.

(c) Does the right of possession belong to the original locator and occupant until this point is settled and does actual possession interpose as a bar against ouster proceedings.

(d) If investigation develops the fact that the stream is used by red salmon must the original occupant vacate in favor of the latter without any right to readjust its appliance to meet new conditions.

(e) The law prohibits the location of any fixed fishing appliance within five hundred yards of the mouth of a red salmon stream. How is this protected area defined? Is it semicircular in shape or is it rectangular having a known width of one thousand yards plus the width of the mouth of the stream and an unknown length into the sea?

(f) If it is semicircular and investigation shows that the original trap is outside the five hundred limit but that a part of the lead is within that distance has the owner a right to remove the objectionable part of the lead and maintain the remainder of the trap as a lawful appliance, or must the entire structure be removed because one part of it is improperly located?

Some other question arose in respect to the standing of dummy traps, or those that were obviously driven to hold locations and not designed to catch fish, the most important of which is here stated:

> One party drives a trap which to all appearance is a dummy, but when a second party drives a trap within six hundred yards laterally of the former, the first party claims that the law has been violated as his trap is protected on both sides to the distance stated. Accepting his own statement as to the genuineness of his appliance and giving it the credibility of a legitimate trap, a subsequent examination of the same reveals the fact that it was not closed on Sunday as required by law. Mention thereof being made to the owner, he now sets up the claim that the trap is a dummy. In other words, it is a legitimate trap when others drive within six hundred yards of it, but a dummy when not closed on Sunday.

Of equal importance is the following:

> A party drives a trap, hangs the web, and puts it in fishing order. Another party does likewise observing, of course, the lateral distance of six hundred yards. Subsequently the first party attaches a jigger 300 or 400 feet long and on the side of the trap toward the second party's trap, and thereupon contends that the second trap stands in violation of law as the lateral distance is less than six hundred yards. The second party explains that the jigger was constructed after his trap was driven, and the correctness of that statement is admitted by the first party who now claims that his trap was unfinished at the time the second one was driven. Several days may have elapsed before the jigger was attached. Will the law uphold the action of the first party. If it does and the second party is thus required to remove his trap the distance of the length of the jigger, how long will it be until the jigger is extended and the trap must be moved again?

The foregoing problems are such as must be met by men in the field who are charged with the enforcement of the law and they are of sufficient importance to merit more than passing notice.

Following the Ikatan events, Karluk again attracts attention by reason of the fact that the run of red salmon was larger than in 1916. The catch was approximately 2,000,000, exceeding last year's catch by approximately 250,000. It should be noted that operations were seriously interrupted this season by continued northerly gales which occurred in the middle of the summer when salmon were running in large numbers. The decline in the production of the Cook Inlet fishery may also be attributed in some measure to unfavorable weather conditions. A southwesterly gale came on just at the time red salmon began to run and continued for about ten days, covering the entire period of the run and doing much damage to traps. Westerly winds of considerable force prevailed during the season at Port Moller, and this is said to be the cause of the small catch of salmon in that locality. Winds from the west make very rough water on the fishing grounds not alone interrupting operations

but driving the fish out into deeper water and eventually on to Bristol Bay.

Humpbacks and chums were notably scarce throughout the district and packers who had expected to put up large packs of these fish were unable to fill their cans.

Fewer salters and smokers of salmon operated than in 1916. This was due , particularly on Cook Inlet, to the scarcity of salmon, and to the higher price of salt and barrels. It may be that in some instances those who had engaged in this business found more profitable employment in other lines of work. Although there is considerable demand for dried and smoked salmon as dog food, the preparation of fishery products of that kind never developed into an industry of any extent and a very small quantity of salmon was utilized in that way in 1917.

Forms of gear.

Traps and seines, both beach and purse, are the preferred forms of fishing gear in use throughout the district. Some gill nets are used on Cook Inlet, but these are operated principally by natives and independent fishermen who sell their catch to the canneries and salteries. Beach seines are used almost exclusively in the Kodiak region. Cook Inlet, Chignik, Morzhovoi, and Ikatan are given over largely to trap fishing. Traps and purse seines constitute the gear used in the Port Moller region.

A total of 138 traps was operated in the district divided among the several regions as follows:

Cook Inlet	80
Kodiak	3
Chignik	12
Shumagin Islands	2
Morzhovoi and Ikatan . . .	31
Port Moller	10
	138

Cook Inlet shows an increase of 15, Chignik gained 3, Morzhovoi 14, and Ikatan 13. There was no change in the Kodiak region, but Port Moller shows a decrease. In respect to ownership, the following decreases are noted on Cook Inlet:

Alaska Packers Association	from	16	to 13, a total of	3
Libby McNeill & Libby	"	17	" 10, " "	" 7
				10

Increases are as follows:

Deep Sea Salmon Co.,	from	5	to 6, a total of	1
Fidalgo Island Packing Co.	5 "	6,	" "	" 1
Northwestern Fisheries	" 4 "	14,	" "	" 10
				12

This indicates a net gain of 2 traps owned by the companies operating

canneries. Those owned by independents, including the Kachemak Canning Co., and the Beluga Whaling Co., increased from 21 to 24, a gain of 3. The increase at Chignik was due to the fact that the Columbia River Packers Association drove 1 trap in Kujulik Bay, and 2 in Aniakchak Bay. Increases in the number used at Morzhovoi and Ikatan were caused by the operation of two new canneries.

Description of gear.

The trap, or pound net, as its name implies, is an appliance which traps or impounds fish. It consists of a number of piles, tie pieces or ribbons as they are called, cotton webbing, and wire netting, and when in fishing order, it comprises a pot, one or two spillers, one or more hearts, in some instances one or two jiggers, and a lead. The length of piling is governed by the depth of water in which the trap is located. Piles must be long enough to leave a few feet above the level of high water and still have about six feet driven in the ground to hold against tides and ordinary seas. The first pile driven is known as the king pile and it occupies the center of the outer line of the pot. Two other piles are driven at distances of 10 and 20 feet on both sides of the king pile, thus giving five piles in a straight line each 10 feet apart and about parallel with the shore. If one spiller is used, this line is extended 40 feet from either end of the line, but if two are used the line is extended 40 feet both ways, giving the trap a frontage of 80 and 120 feet respectively. The remaining sides of the pot and spillers are then driven, the piles being placed about 10 feet apart, thus making the pot and spillers each 40 feet square. Only one set of piling is driven between the pot and

spiller. The heart is next driven so that the point connects with the pot on the inshore side. Its size varies considerably, but it is rarely less than 100 feet long by 60 feet wide. If two hearts are used, the point of the second one connects with the inshore end of the first. The lead begins at the opening in the large end of the heart and is driven in a straight line to the shore. The ribbons are poles or planks lashed or spiked to the top of the piling connecting one with another and bracing them. The planking that joins the piling in the pot and spillers is known as capping. The jiggers are hook-like attachments driven from the extreme end of the heart at right angles from the lead the purpose of which is to turn back toward the lead any fish that may have been diverted therefrom. So far only the frame work of a trap has been described.

The pot and spillers are made of 54-thread cotton webbing with a 3-inch mesh. The perimiter of the pot is 150 feet and of the spiller 160 feet; their depth is 40 and 25 feet respectively. The bottoms are made of the same sized webbing. When put together, the pot and spillers are square and are suspended inside and attached to the piles and capping provided for each. The tunnels, one of which leads from the heart into the pot, and the other from the pot into the spiller, are made of 27-thread twine and have a 3-inch mesh. A piece of web 72 feet long and 13 feet wide is used in making the pot tunnel which has a depth of 36 feet thus bringing it to within 4 feet of the bottom of the pot and giving it an inward extent of 13 feet. The spiller tunnel differs from the other in size only as it is but 17 feet deep and 12 feet wide. The outer edges of the tunnels are fastened to the walls of the pot and spiller while the inner

edges converge until they are within 2 feet of each other in which position they are held by lines to piles. Each tunnel is held open by 3 wooden spreaders about 2 feet long, one each at the top, center, and bottom of the opening. The hearts, jiggers, and lead are constructed of wire netting which is made of No. 16 galvanized wire with a 2 by $4\frac{1}{2}$ inch mesh. The netting is woven 6 feet wide and cut into 200-foot lengths. To strengthen it, longitudinal wires are woven in every two inches. A number of the widths of this netting are joined one above the other with common hog rings and they are sufficient to reach from the level of the pot to the ground around the hearts and jiggers, and along the lead in the form of a fence, the top of which is nailed to the ribbons at the top of the piles. The bottom edge is held in place by being weighted with rocks. Fish striking the lead follow it off shore in search of a passage and in this manner they are led into the heart through an opening about 10 feet wide. By following the heart walls, they pass into the second heart if two are used or directly into the pot through the first tunnel. Continuing their search for an outlet, they find the tunnel that leads them into the spiller, and passing thence, few if any ever escape by the way of their entrance, although the tunnels are open most of the time. In removing fish from these traps, one side of the spiller is lowered until a small scow can be put inside. The lowered edge is fastened to a lighter or boat. Six or eight men in the scow gather up the web on the side opposite the lowered edge, forcing the fish to gravitate toward the lighter or boat into which they are dipped or brailed by hand or by a winch. When brailing is completed, or the lighter filled, the scow is removed, and the lowered edge of the net is brought to its proper position. The

brails are made of 96-thread twine.

Drag seines vary in size considerably. Those used at Karluk are 400 or more fathoms in length and 27 feet deep in the center and 18 feet at the ends. They are made of 15, 18, and 42-thread hard laid twine. The ends of the nets are made of the lightest twine while the center or bunt which gets all the heavy wear is made of the heaviest, leaving the middle weight for the intermediate sections of the seine. One inch rope is is used for both cork and lead lines. Beginning at the ends of the seines, the corks and leads are placed every three feet, but this distance is gradually lessened until they are not more than one foot apart at the center. The corks are about five inches in diameter and three inches thick; the leads weigh four ounces and are 1½ inches long.

Purse seines differ from drag seines chiefly in depth, and by having the bunt at one end rather than the center. Those used at Port Moller were 11 fathoms deep and 200 fathoms long. In addition to the regular cork and lead lines, these nets are equipped with an extra line which passes through iron rings on the lead line. By it, the net is drawn together under the fish.

Gill nets used in fishing for salmon are made of 48-ply linen thread and have meshes from 5½ to 9 inches in length, according to the kind of salmon for which they are used. Reds are taken in nets that usually have a 5¾ inch mesh; kings are caught in nets that have from 7½ to 9 inch mesh. Length and depth of nets are determined by conditions peculiar to the locality where used.

Salmon Canning.

New canneries.

The San Juan Fishing and Packing Company built a one-line cannery at Seward, which was operated in connection with a cold storage plant also established by this company. The Northwestern Fisheries Company rebuilt its plant at Kenai, putting up three buildings each 50 x 200 feet. The center one is the cannery and it is equipped with two lines of one-pound tall canning machines. The other buildings are warehouses; both of them are two stories high. A new fish house and elevator were also built. All in all this cannery is the model establishment in the district.

The Sockeye Salmon Company built a two line cannery on the east shore of Morzhovoi Bay. The Pacific American Fisheries built a three line plant in the Aleutian Islands Reservation on the shore of Unimak Island, Ikatan Bay. Two three line canneries were built near the head of Herendeen Bay, one by the Fidalgo Island Packing Co., and the other by the Phoenix Packing Co.

Changes in canneries.

In December, 1916, the Columbia Salmon Company sold its Seldovia cannery to the Northwestern Fisheries Company.

Improvements in canneries.

The Kadiak Fisheries Company installed a line of half-pound flat canning machines, except filler, in its cannery at Kodiak. Two small additions were made to the cannery building, and one new warehouse was

erected. The cannery tender REDONDO was sold and an 85-foot gas boat equipped with a 125-horse power Atlas engine built to replace the steamer. The Pacific American Fisheries improved its plant at Kings Cove by the installation of a wireless station and the building of a marine ship-way capable of hauling out most any sized cannery vessel.

Canneries operated.

Canneries were operated in this district by the companies and at the places named below:

Alaska Packers Association	Alitak Chignik Kasilof Larsen Bay
Bering Sea Packing Co., ...	Herendeen Bay.
Deep Sea Salmon Co., ...	Knik Arm.
Fidalgo Island Packing Co., ...	Herendeen Bay Port Graham.
Kadiak Fisheries Co., ...	Kodiak.
Libby, McNeill & Libby	Kenai.
Nelson Lagoon Packing Co., ...	Nelson Lagoon.
Northwestern Fisheries Co., ...	Chignik. Kenai. Seldovia. Uyak.
Pacific American Fisheries	Ikatan Bay. Kings Cove. Port Moller.
Phoenix Packing Co., ...	Herendeen Bay.
SanJuan Fishing & Packing Co, ...	Seward.
Sockeye Salmon Co., ...	Morzhovoi Bay.

This shows an increase of 6 canneries for the district, there being 15 in operation in 1916 as against 21 in 1917.

Method of canning.

Upon delivery at the cannery, the fish are pughed into an elevator which conveys them into the fish house where they are butchered and made ready for canning. To remove some of the slime, the fish are given a preliminary washing as they pass up the elevator by having jets of water played on them. The first step in butchering is to sever the head of the fish. The salmon are placed one at a time under a knife that is operated in connection with the "Iron Chink", and lifted against it by a revolving feeder that delivers them into a chute leading to the "chink". They are fed into this machine by hand tail first and belly up. The mechanism that holds the fish also revolves and in so doing the fish is brought in contact with knives that cut off the fins and tail and open the belly. Some are equipped with brushes or scrapers that remove the blood along the back bone as well as the viscera. They are dropped by this machine onto a belt conveyor that delivers them onto the sliming tables. The cleaning of the fish is then completed by workmen designated as slimers who remove the blood along the back bone and any fins and viscera that may not have been cut away by the machine. The fish pass from the slimers into tanks of water where they receive the final washing by being stirred therein. They are then pughed into carts or onto an inclined drain-board or box, and thence placed by hand in a machine which cuts them into sections exactly the length of the cans to be filled and passes them on to the filling

machine. This machine in turn fills the cans with the desired quantity of fish and throws them out on a table where they are inspected as to fullness. The cans are fed to the filler through a chute from the loft above, and each one receives a quarter of an ounce of half-ground salt before being filled with fish. After the cans are examined as to weight, they move on a belt to the topping machine which puts a top on each, clinches it just enough to hold it on while passing through the exhaust box into which it now goes. A temperature of 212 degrees Fahrenheit is maintained in this box, and about 15 minutes are required for a can to pass through it. During that timethe can is sufficiently heated to expel much of the air it contains. It was for this reason that the top was insecurely fastened on the can before it entered the box. Some canneries have done away with the exhaust box and have substituted a vacuum machine which mechanically exhausts the can and seals it before releasing the suction. The cans pass from the exhaust box to the double seamers where the top is securely fastened. They are now ready for their final cooking. For convenience in handling, they are placed on iron frames or trays called coolers, each of which holds about 165 cans. These coolers are stacked six or seven high on small trucks and pushed into the retorts for cooking. Each retort holds three or four trucks of coolers, and it is equipped with a door that is shut by means of clamps or heavy bolts so tightly that it will withstand a steam pressure of fifteen pounds to the square inch. Under this pressure and at a temperature of 240 degrees Fahrenheit the cans are cooked for an hour and a quarter or an hour and a half. Either imme-

diately before or after the cooking, each cooler of cans is immersed in a tank filled with water and tested for leaks. Leaking cans will emit bubbles of air as a result of the heating in the exhaust box or retort. The cans are then dipped in a tank of lye water merely to clean them of grease and particles of fish that may adhere, thus insuring a clean can before being lacquered and labelled. Since the introduction of the enameled tops, some canning companies no longer lacquer the cans.

Traps operated in the canning industry.

The following list indicates the number of traps operated by the canning companies:

Alaska Packers Association	18	
Deep Sea Salmon Co., ...	6	
Fidalgo Island Packing Co., ...	6	
Libby, McNeill & Libby, ...	10	
Northwestern Fisheries Co., ...	24	
Kadiak Fisheries Co., ...	1	
Columbia River Packers Association . . .	6	
Pacific American Fisheries	31	
Sockeye Salmon Co., ...	4	
Nelson Lagoon Packing Co., ...	5	
Bering Sea Packing Co., ...	1	112

The following independents operated traps and sold their catch to the canning companies:

Jack Tansy	1
Alex Elxnit & Walter Kotoff	1
Mat Yuth	1
Fred Kvasnikoff	1
J. Yakinski	1
Anton Olson	1
Emil Ness	1
Emil Berg	1
John Wik	1
Albert Thompson	1
Ryan & Miller	1
Otto Zachlin	1
A. Nyman	1
E. N. Pond	1

Martin Johnson	1	
Andrew Berg	1	
Richard Hughes	1	17
		129

As shown by this list, the total number of traps operated in the canning industry was 129.

Salmon Pickling.

The number of salteries operated in the season of 1917 was considerably less in central Alaska than in 1916, particularly on Cook Inlet. As far as is known, only four firms salted salmon in that region. They are as follows:

Kachemak Canning Co., ...	Swanson Creek.
Beluga Whaling Co., ...	Three Mile Creek.
Mike Knuteson & Co., ...	Tuxedni Harbor.
Petersen & Hansen	English Bay.

In the Kodiak region, two salteries were operated, one by the Northern Fisheries, Inc., and the other by W. J. Riegel, on Uyak Bay.

The Shumagin Packing Co., a new concern, purchased one of the codfish stations at Squaw Harbor, Unga Island, from John H. Nelson, and utilized it as a salmon saltery, packing over 900 barrels of fish. August Lindquist continued operations at Orzenoi, and Nick Creveden at East Bay. The Union Fish Co., also engaged in salmon pickling near Unga.

The production of pickled salmon for the entire district will hardly exceed 3,000 barrels.

All forms of gear were used in catching the salmon. Those operating traps appear in the following list:

Kachemak Canning Co., ...	3

Beluga Whaling Co., ...	1
Amundsen & Mitchell	1
Moore & Thompkins	1
Shumagin Packing Co.,, ...	2
	8

Method of salting.

The method of handling salmon for pickling purposes is simple, all of the work being performed by hand. When the fish reach the saltery, they are thrown on a table near the end of which stands the header who with an ordinary butcher knife cuts off the heads just back of the gill covers. In doing this, the fish are taken one at a time and held by the left hand on the table with backs up while the operator removes the head with a downward motion of the knife in the right hand. They are then passed to the splitter who lays them one at a time on their side with backs towards him and near the edge of the table. He splits it from head to tail along and just above the back bone being careful not to cut through the belly. Laying the fish open with the left hand, he makes a similar cut just under the back bone and removes it from the head to the end of the body cavity. Skilled splitters turn the knife over at the end of the first cut and with a swift backward cut remove the bone. The bone is cut away with as little meat attached to it as possible in order that there may be no loss of the edible portion of the fish. The fins and tail are not cut off. The fish pass from the splitter to the slimers who remove the viscera and membranes of the belly, after which they are thrown into tanks of water and washed. After washing, the fish are carted or carried to the salting tanks, which are usually round, having a diameter of from 6 to 8 feet and a depth of 5½ feet. Before any fish are put

into the tanks, the bottoms are sprinkled with salt. The fish are then spread in layers with flesh side up, tails toward the center, and none over-lapping. Each layer of fish is in turn covered with salt, care being taken to spread it evenly and completely over the fish. This is important and it is the most particular part of the process. Fish that over-lap without salt between them will not cure properly but rust. As fast as one layer is spread and covered with salt, another is laid, and so on until the tank is filled, or the day's catch is put away. When the tank is full, the fish are weighted down with stones laid on short pieces of boards, and in a few days they will be covered with pickle of their own making. No water is used in the tanks as the fish throw off enough to make ample brine. They remain in this condition until cured, which requires from 11 to 14 days. The fish are then removed from the tank, carefully selected and washed, and repacked into barrels. In washing, they are rubbed with a piece of burlap or gunny sack. This is also important work as the fish must be perfectly clean to bring the best price. All rusty ones, or those showing pugh marks and discolorations of any kind are thrown out and packed as seconds. Little salt is required in the repacking as the fish are now thoroughly cured. They are packed in barrels that hold 200 pounds of fish, being laid in pairs with flesh side up, until the top layer is reached which is turned with the skin side up. A small quantity of salt is sprinkled over each layer. As the barrels are filled, the heads are put in, the hoops tightened to prevent leaks, and a bunghole is bored in the bilge so that pickle of full strength may be added from day to day until the barrel is full. Immediately after washing, the fish

for each barrel are weighed separately and a few pounds extra added to insure a net weight of not less than 200 pounds. The barrels are not allowed to remain standing on end after being packed. When ready for the market, each barrel should have the name of the packer and the kind of fish it contains marked on its head. The exact quantity of salt required for a given number of fish or barrels is not known as this seems to be determined largely by experience and observation.

Mild-curing.

Mild-curing operations in central Alaska have never been of much consequence, as the run of king salmon is very small. Cook Inlet has been the only region that has yielded enough to make mild-curing worth while. The Kachemak Canning Company purchased and mild-cured all the king salmon taken in gill net fishing along the Tyonek beach by the natives living there, paying for them at the rate of 40 cents per fish.

Mild-curing process.

Extreme care in handling the fish throughout the process is essential to secure a high grade product. In dressing the fish the head is first removed and then the fins, after which the belly is opened and the viscera removed. It is then split along the back bone with a very sharp knife so that there be no tearing of the flesh. One side is thus removed. A second cut made like the first severs the bone and tail from the remaining side. The sides are then carefully washed and all the blood pressed out of the prominent veins. Following this, they are put into a strong brine where they remain about 10 hours, after which they are packed in tierces and sprinkled with fine salt, about 100 pounds being used for

each tierce. They remain in this condition for two weeks during which time they are mild cured. The process is completed by grading according to size and repacking them into tierces that hold 800 pounds of fish net. The tierces are kept in a cool place until shipped.

Drying of salmon.

Salmon are not dried for commercial purposes to any extent in central Alaska although a small quantity is prepared each season by operators of fox ranches and the owners of dogs. Heretofore the catch from some of the mosquito traps on Cook Inlet was used almost entirely for this product, but with the scarcity of salmon and the greater demand for them at the canneries and salteries this season, practically nothing was done in the way of drying. George Manuel, the operator of a mosquito trap at Moose Point, is believed to be the only one who attempted the drying of salmon for commercial use. It is understood that his entire catch was so prepared.

Cod Fisheries.

Little change is noted in the cod industry of central Alaska from year to year. This business is centered around the Shumagin and Sannak Islands, where a number of shore stations are operated, chiefly by the Union Fish Company and the Alaska Codfish Company, In addition to these, the Pacific American Fisheries engaged in cod fishing off Cape Pankof, using the gas boat LEO C II for that work. The fish were salted down in the hold of the vessel until a fair catch had been made, when they were brought to the cannery at Kings Cove and transferred to tierces to cure. After curing, they were repacked into tierces and shipped to the plant at South Bellingham for further processing.

An effort is being made by the Northern Fisheries, Inc., to develop a cod fishery in the vicinity of Kodiak. This company has established a shore station on the Kodiak dock of the W. J. Erskine Company by building a fish house and setting up 11 tanks in a building formerly used as a salmon saltery. During the year, the company lost two vessels. The schooner HAROLD BLEKUM was wrecked at Ugak Bay in March when returning to Seattle for supplies; and the auxilliary schooner HUNTER struck a rock off Sutwik Island in August and foundered immediately. She was returning to Kodiak with a catch of cod from the banks adjacent to the Shumagin Islands. The auxilliary schooner PROGRESS is being operated by this company both as a fishing and transporting vessel, making her catch in waters to the westward and delivering it with the fish from the Kodiak station to the home plant at Anacortes, Washington. The auxilliary schooner VALDEZ

has been converted into a fishing boat and is in use at Kodiak. Preparations are being made to use the schooner Chas. E. Brown as a salting station at Three Saints Bay, Kodiak Island.

Forms of Gear.

The forms of gear used in this fishery are hand lines and trawls. Hand lines are usually equipped with two hooks while the trawls may have several hundred. The ground line of a trawl is made of 16-pound tarred line. At intervals of five feet are attached 2-foot lengths of 8-pound tarred line to each of which is fastened a hook. The spacing is just great enough to prevent entanglement of the hooks when the trawl is set. The line is anchored at both ends and its location marked with a buoy. No. 10 hooks should be used.

Method of salting.

As soon as possible after being taken from the water, the throat of the cod is cut in order to bleed the fish. Upon delivery at the saltery, the first step in cleaning is to remove the head and open the belly. This is done by laying the fish on its back and grasping the head in one hand while with the other a short cut is made on each side of the head just back of the gills, the belly is opened to the vent, and the neck is cut straight down from the gill opening to the back bone, after which this bone is broken over the edge of the cleaning tank or table and the head torn away with a twisting motion, thus saving flesh that would be lost if the head were entirely severed by the knife. The second workman tears away the viscera and passes the fish on to the splitter. His work is to

remove the back bone. Laying the fish on its side with belly toward himself and tail to the right, a short cut is made from the end of the body cavity toward the tail so that the upper side can be held away from the knife as it cuts the ribs and splits the fish along the back bone to the end of the tail. The bone is then cut about midway of the length of the fish and the ribs on the other side are cut in like manner as those on the upper side except that the cut is made backward, beginning at the point where the back bone was severed and extending to the head. The bone is grasped at the point of severance and torn away with out further cutting, thereby saving quite a little meat of the fish. The splitter now drops the fish into a tank of water where it is washed, and thereafter it is taken to the salting tank where they are spread in even layers with flesh side up and tails toward the center. Careful workmen sprinkle each layer evenly with salt and see that no fish over-lap without salt between them. Cod will cure in 11 days but it is better to leave them in the tanks at least 14 days. They are then thoroughly cured and can be shipped dry.

Method of canning.

In cleaning, the fish are prepared in the same manner as for salting. Cod are very watery fish and it is necessary to reduce this excess of water. This is accomplished by spreading the fish on trays and putting them in the retorts where they remain about twenty minutes at a temperature of 212 degrees Fahrenheit under a pressure of ten pounds of steam. This heating or drying of the fish not only reduces the water they contain but it loosens the skin and this is peeled off by hand immediately after the

the fish are taken from the retorts. They are then flaked and hand-packed into one pound and half pound tins, a ¼ of an ounce of salt being used in each can. The cans now pass through the toppers and then into the vacuum machines which exhaust and double seam them. The process is completed by cooking them in the retorts 1¼ hours under a temperature of 240 degrees F. and a steam pressure of 15 pounds.

Herring Fishery.

It has often been said that the herring of Kachemak Bay, Cook Inlet, are among the best taken from Alaskan waters as they are very fat and exceptionally large; but even with these advantages, production has been small and prices low. Packers have experienced much difficulty in disposing of their packs in Seattle and have frequently sold them at a loss. With a superior fish to pack and a constant demand for good herring, it would seem that there should be ready sale for their product if it were prepared in a manner acceptable to the trade. Too often, it may be, methods are followed that involve the least possible work, and a comparatively low grade product results. First quality fish may be rendered worthless by improper curing and packing.

The Kachemak Bay herring are not usually in prime condition earlier than November. By that time the low temperatures of winter have come on and the fish are often frozen before they can be put into cure, and consequently the salt does not take effect. This was the case last winter when packing was tried with the temperature at zero or lower. Those who have engaged in the business were handicapped by having no facilities for winter work as packing was carried on largely in the open with only tents or temporary sheds for shelter. Unless packers can build salteries that may be heated, and deliver the fish to them before freezing, there is doubt about the development of this fishery in the Cook Inlet region to its maximum production at a time when the herring are in best condition.

A very good quality of herring is also taken in the vicinity of Kodiak, and a material increase in the pack is being made this season. The Kadiak Fisheries Company has packed more than 1,000 barrels, taking the fish right at the cannery.

A small pack was also made at Lake Bay, near Chignik, by Larsen & Olsen, who operated during the summer. It is probable that many fields to the westward could be profitably exploited if transportation facilities were better but under present conditions little can be expected.

Gear.

Seines and gill nets are used in catching herring. The seines in use at Kodiak are 200 fathoms long and 8 fathoms deep. They have a one-inch mesh and are made of 9-thread twine. Gill nets are made of linen thread and have a two-inch mesh.

Method of Packing.

It is not known that the method here described has any distinctive name unless it is called the Norwegian cure, which seems to be the one generally followed in this section.

At Kodiak, the gibbing is done by women, boys, and girls. The herring are dumped into boxes or trucks which are about four feet square and thirty inches deep around which gather those who do the gibbing. As fast as the fish are gibbed, they are graded according to size and thrown into barrels conveniently arranged. They are then taken in hand by the packers. These workmen transfer them into barrels that have been tested and soaked. The bottom of the barrel is first sprinkled with

salt and then a layer of fish is put down. Each fish is set on its back, the first one being against the side of the barrel and the next two set from opposite directions with tails toward the center, while the fourth fish is set in the center against the tails of the last two, and son on until the bottom is covered. One or two herring were laid on their sides in the low places on both sides of the barrel where the heads of those set upright come together. It was noted that these fish were not kept straight in a vertical position but had a decided slant. This layer is then covered with salt and another layer of fish put in, crossing the other at right angles, and so on until the barrel is full, each layer receiving its covering of salt. After being packed with fish, the barrel is filled with pickle of such strength as to float a potato, headed up and rolled away on its side to cure, which process requires from ten to twelve days. Pickle is added from day to day through the bunghole as required. After the fish have cured, the barrels are repacked with fish of the same selection and same day's cure. The shrinkage in the curing process is about twenty per cent. The barrel is reheaded and then ready for shipment.

The Kadiak Fisheries Company could not be induced to try the Scotch cure, for no apparent reason than that it necessitated more work and greater care in packing.

List of Afognak Natives licensed to fish in the Afognak Reservation.

- -

Agick, Matfay
Algoon, Ivan
Alexandroff, Simeon
Amachook, Samuel

Boskofsky, Michael

Chernikoff, Constantine
Chernikoff, Gregory
Chernikoff, Lionty
Chernikoff, George
Chernikoff, Mike,
Chernikoff, Anaufry
Channin, George
Channin, Logan

Derinoff, Ivan

Eurioff, Kusma

Kashikan, Robert
Keligmu, Egore
Katelnikoff, Nicholai
Katelnikoff, Paul
Katelnikoff, Feofil
Knagin, Alex

Larsen, Martin
Larsen, Anton
Lukin, Samuel
Lukin, William
Lukin, John
Loe, Ingwald
Lukin, Alexander

Malutin, Radion

Nekrassoff, Paul
Naya, Timothy
Naya, Anton
Nekrassoff, Wasilie

Orloff, John

Pikoon, Nicholai
Pikoon, Herman
Panamarioff, Waka
Panamarioff, Sergay
Panamarioff, Stephan
Panamarioff, Martin
Pestrikoff, Nicholai

Susurenkin, Nicholai
Sheratin, Sergay,
Shangin, Herman
Shangin, Trefin
Squartsoff, Simeon
Squartsoff, Fimpeta
Squartsoff, Wasilie
Squartsoff, Theodore

Toshwak, John
Toshwak, Mike

Yakanak, John
Yakashoff, Xenophon
Yakashoff, Mike
Yakashoff, Demetri
Yakanak, Gregory